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FOREST INSECT CONDITIONS IN CALIFORNIA 1955

cc BHoward 2cc Sent Chief WO. 1/29/58 w/ Alamo Data as Exhibit #43 - Alamo [illegible]

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The California Forest Pest Control Action Council is composed of representatives of the following organizations:

California Forest Protective Association

State of California Bureau of Entomology

State of California Division of Beaches and Parks

State of California Division of Forestry

U. S. Bureau of Indian Affairs

U. S. Forest Service

U. S. National Park Service

University of California

Western Pine Association

Cover - Outline Map of California showing the location of Detection Reports received during 1955

- ● Report of Forest Insect Activity
- ▲ Report of Forest Disease Activity

FOREST PEST CONDITIONS IN CALIFORNIA

As Revealed by Surveys During 1955

Official Report of the

CALIFORNIA FOREST PEST CONTROL ACTION COUNCIL

Sacramento January 1956

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SUMMARY OF FOREST PEST CONDITIONS DURING 1955

FOREST INSECTS

An estimated 1,425 million board-feet of stumpage, worth approximately 21.4 million dollars, was killed this past year throughout the State of California. This loss represents a slight increase over last year, and is about average except for some increase in monetary value due to increased stumpage. Losses in all pines accounted for 11.8 million dollars, while Douglas-fir and white fir losses accounted for 6.4 and 3.2 million dollars respectively.

The Douglas-fir beetle, which became a serious problem in 1954, has shown signs of receding. Even though a drop in population may have occurred during 1955, this beetle still maintains epidemic numbers.

Infestation by the lodgepole needle miner has spread again this flight year, and the mountain pine beetle, which is closely associated with the needle miner damage, has killed about 50 percent of the lodgepole in two drainages within Yosemite National Park. An adjacent third drainage was found this year to have been invaded by this beetle.

Just west of the Yosemite National Park the Douglas-fir tussock moth population in Tuolumne County increased to epidemic numbers this past year, resulting in damage to white fir on about 6,000 acres.

A wood-boring beetle, Arhopalus productus (Lec.), gained some notoriety during the year by its damage to new houses. Even though damage by this insect is less than tree-killing insects, wood borers in homes have a greater personal impact than the insects which confine their damage to trees in the forest.

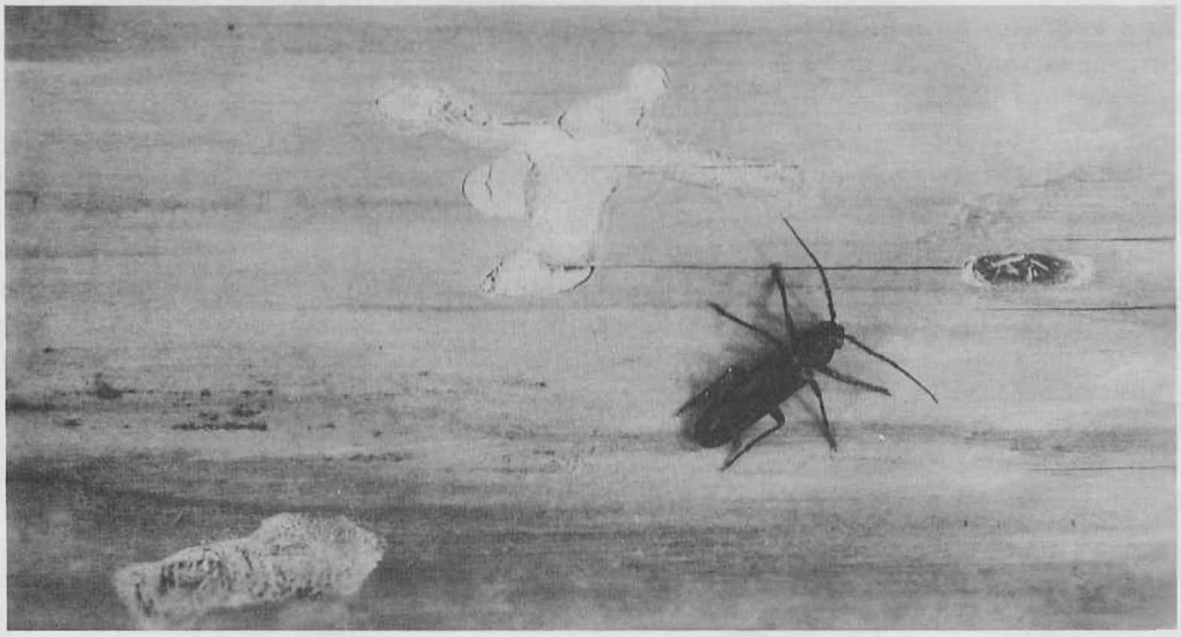

Figure 1. Arhopalus productus beetle on finished Douglas-fir lumber showing typical damage to the lumber resulting from larval feeding mines.

Damage by the pine engraver-western pine beetle complex was thought to be at a low level until after the end of the year, when the ponderosa pine which had been attacked in the fall began to fade. It appears now that damage is quite extensive throughout the central Sierra region.

Southern California continued to suffer losses from the California flatheaded borer, whereas the bark-beetle damage in this subregion was relatively low except in the Julian area. Cone and seed insects took a heavy toll of potential reproduction badly needed in many parts of the state. Damage from the fir engraver, mountain pine beetle, and fir sawfly remained generally at an endemic level although some local outbreaks were reported.

Potentials for damaging insect outbreaks occur throughout the state. Hundreds of trees in each of the areas burned by wild fires this past summer may become infested by bark beetles. The trees killed outright are not acceptable to the tree-killing bark beetles, but those trees which are only slightly damaged by fire may be predisposed to insect attack. Special attention should be given these burned areas this coming season. Any bark-beetle activity found should be reported by detection report form to the California Forest and Range Experiment Station.

FOREST DISEASES

The most noteworthy discovery made in this first year of the survey is that heavy and extensive damage from dwarfmistletoe occurs in red fir stands throughout the Sierras. The greatest losses were found in the southern Sierras. Dwarf-mistletoe was also found to cause more damage in ponderosa and Jeffrey pines than previously realized. Damage by this parasite was found in other conifers, but no alarming losses were encountered.

Damage caused by the Elytroderma needle disease was reported from several locations and was observed to occur generally throughout Sierra ponderosa and Jeffrey pine stands. Next year's survey should give us a better evaluation of the damage this fungus is causing in the state.

White pine blister rust is epidemic in many of the young stands in Siskiyou and Shasta Counties, where it is causing extensive mortality to small sugar pines. The rust is present on sugar pines in many localities throughout the sugar pine type in the northern part of the state as far south as Dodge Ridge in the Sierras and the Yolla Bolla Mountains in the Coast Range. On western white and white bark pines the rust is causing severe damage and losses in trees of all sizes throughout the Marble Mountains in Siskiyou County and occurs in much of the high elevation white pine types in other parts of northern California.

A number of other conifer rusts occur throughout the state and cause considerable damage in ponderosa and Jeffrey pines in some localities. Most severe and extensive is the damage and mortality in high elevation lodgepole pine stands. Needle casts were especially prevalent in 1955. These fungi that cause partial defoliation of various conifers, although causing loss of increment in trees of all sizes, are of more concern in the disfigurement of potential Christmas trees.

While most of the serious root diseases were at a relatively low ebb in 1955, one, the Leptographium disease of ponderosa and Jeffrey pines, flared up in the vicinity of Blacks Mountain, where trees of various sizes from small poles to old veterans were killed.

Non-infectious diseases were reported from several localities. Some winter injury occurred in the eastside Sierra forest, of which the most prevalent was top killing in young incense-cedar. Two other noteworthy reports were of decline and dying of Douglas-fir in Shasta County and ponderosa and Jeffrey pines in San Bernardino County.

SURVEYS OF FOREST PEST DAMAGE

The forest pest survey for the State is dependent upon the cooperative detection program. This program enlists the cooperation of the field employees of private industry, state and federal government. If the man in the field fails to inform others of the forest pest damage he finds, it is likely that the infestation may go unheeded until it is of such proportions as to constitute a hazard to a large area. Protection against pest outbreaks is therefore the responsibility of everyone who takes his livelihood from the forest. The screening of the detection survey reports received from field personnel is handled by the California Forest and Range Experiment Station. The Experiment Station is further charged with the responsibility of determining the potentialities of the forest pest involved and assessing the need for control. These determinations are made from an analysis of the number of affected trees, the amount of area affected, and the status of the insect or disease. This analysis is called an appraisal survey. The response from field men in reporting forest pest damage this past season was very encouraging. Over 100 detection reports were received, more than have ever been processed before. About a fifth of these reports required further investigations to determine the advisability of control.

Detection of blister rust is not handled by the Experiment Station, but rather by the Blister Rust Control Unit, Region 5, U. S. Forest Service. Detection surveys for blister rust in any given locality consist of an adequate sample of the most favorable rust sites, such as streams and meadow edges where ribes and white pines occur in close association. Individual pines are picked at random and scrutinized for blister rust cankers. When a rust infection is found, data on its age is recorded. Blister rust appraisal surveys consist of systematic sample to determine the extent of rust infection within specific sugar or other white pine stands. The past year brought two changes in insect damage reports: (1) The scope of the detection reports was broadened to include damage from forest diseases and damage from animals; (2) a greater effort was made to acquaint the author of the detection report with its disposition after it is screened.

Other changes in survey procedures were made in operation of the statewide aerial survey: (1) 1955 was the first year that private landowners were not asked to assist in inspecting their own lands. This practice was dropped after it was shown that the benefits to the government and the private owner did not offset the

cost of added airplane ferry time. However, in order to insure that private interests were represented, a man was provided as an observer from the State Forester's Office. (2) An increase in airplane survey costs had to be absorbed this year when it was found that a government-owned and operated airplane would no longer be available as in previous years. (3) The timing of the annual survey was advanced to May instead of the usual fall survey. This change to a spring survey was made so as to allow more time for ground checking any damage which might be found. No serious infestations were found during this May survey.

In order to check on late season damage in critical areas, some aerial examinations were made in the fall of 1955. Weather conditions prevented a survey of the Douglas-fir area, but about 15 hours were spent in checking areas of known infestation in the Sierra Nevada. This fall flight was made by an entomologist and a pathologist from the Experiment Station, assisted by an observer from the State Division of Forestry.

Further progress was made towards the development of plans for a statewide system of permanent plots to sample the annual mortality due to insects and disease.

STATUS OF THE MAJOR FOREST INSECT PESTS DURING 1955

DOUGLAS-FIR BEETLE, Dendroctonus pseudotsugae Hopk.
In the summer of 1952, an infestation of the Douglas-fir beetle began to develop in the large volume of Douglas-fir blown to the ground by high velocity winds the winter before. As a result of this infestation, serious losses in Douglas-fir have occurred since 1953 on some 200,000 acres throughout the Klamath River and Trinity River drainages in northwestern California. Studies made this season, along with limited aerial observations, indicate that the 1955 spring attacks were less numerous than those of the previous year, although it is not yet known whether the infestation will continue to decrease. The decline of the infestation is the result of natural causes rather than the results of artificial control. Many of the infested trees have been salvaged so that a great deal of value was realized which would otherwise have been lost, and perhaps a small measure of control was obtained from the removal of some of the beetle population.

LODGEPOLE NEEDLE MINER, Recurvaria milleri Busck.
Heavy defoliation of lodgepole pine in Yosemite and Sequoia-Kings Canyon National Parks has continued during this year from feeding of the lodgepole needle miner. The infestation in Yosemite extends over about 45,000 acres, and the one in Sequoia-Kings Canyon over about 3,000 acres.

MOUNTAIN PINE BEETLE, Dendroctonus monticolae Hopk.
In two adjacent drainages within the area of heavy needle miner defoliation in Yosemite National Park, the mountain pine beetle killed approximately 48,000 lodgepole pine on 5,400 acres. The magnitude of this infestation and its inaccessibility make it impractical to attempt control. Another infestation of mountain pine beetle, infesting pole-size ponderosa pine on the Nevada side of Lake Tahoe, has remained active for the third year. No other important outbreaks have been

noted in the state, though maintenance control of the mountain pine beetle is carried out on the Reds Meadow area of the Inyo National Forest and in Yosemite and Sequoia-Kings Canyon National Parks.

CALIFORNIA FLATHEADED BORER, Melanophila californica Van D.
Losses in Jeffrey and ponderosa pine in southern California areas, where no control has been conducted against the California flatheaded borer, have remained relatively high. Conversely, in the areas where maintenance control has been conducted against these beetles for the past three years, losses were relatively light.

JEFFREY PINE BEETLE, Dendroctonus jeffreyi Hopk.
One area of Jeffrey pine beetle infestation was found west of Adams Peak on the Plumas National Forest. Tree mortality was aided by attacks of the pine engravers and the California flatheaded borer. The large amount of slash left on the ground after logging was undoubtedly a factor in the development of this infestation. Control was not instigated. Sanitation-salvage logging on the Lassen and Inyo National Forests and direct control in Lassen National Park have kept these three areas free from Jeffrey pine beetle epidemics.

WESTERN PINE BEETLE, Dendroctonus brevicomis Lec., and
PINE ENGRAVERS, Ips spp.
Throughout the summer pine losses due to the western pine beetle-pine engraver complex, were quite light. After the long, dry fall, however, fairly extensive losses began to show up in young stands throughout the central Sierra foothills. In the majority of cases, these losses resulted primarily from a pine engraver population buildup in logging debris, where no attempt at slash disposal had been made. So long as these optimum breeding conditions are provided for the development of heavy bark-beetle populations, control efforts cannot keep these infestations suppressed. When pine engravers are abundant and the western pine beetle is not aggressive, control is seldom recommended; however, when the western pine beetle does become the more aggressive of the association, control is usually advocated.

DOUGLAS-FIR TUSSOCK MOTH, Hemerocampa pseudotsugata McD.
Since about 1952, an infestation of the Douglas-fir tussock moth has been on the increase in Tuolumne County. This insect has hitherto been erroneously referred to as Oslar's tussock moth, Hemerocampa oslari, Barnes. Tussock moth feeding in 1955 resulted in serious defoliation of white fir on about 6,000 acres. This moth builds to epidemic proportions within two or three years, and may recede even faster, often within one to two years. Decline of this infestation was found, but further observations will be necessary before this can be definitely determined.

OTHER IMPORTANT INSECTS
The fir engraver, Scolytus ventralis Lec., caused scattered losses in white fir throughout the host's range. The sugar pine cone beetle, Conophthorus lambertianae Hopk., which causes sugar pine cones to drop before they mature, infested most of this year's cones. Field checks made in the Sierras indicated that a

Fir cone moths, Barbara spp. ('54 Report)

mature sugar pine cone was a rarity. One sample of Douglas-fir seed showed that the Douglas-fir seed chalcid, Megastigmus spermotrophus Wachtl., had destroyed 25 percent of the seed, and 65 percent was destroyed by unknown causes, some of which may have been insects. The flatheaded fir borer, Melanophila drummondi (Kby.), was reported to be killing Douglas-fir in the northeastern part of the State, but upon further examination it was found that these beetles were secondary to an undetermined physiological disorder.

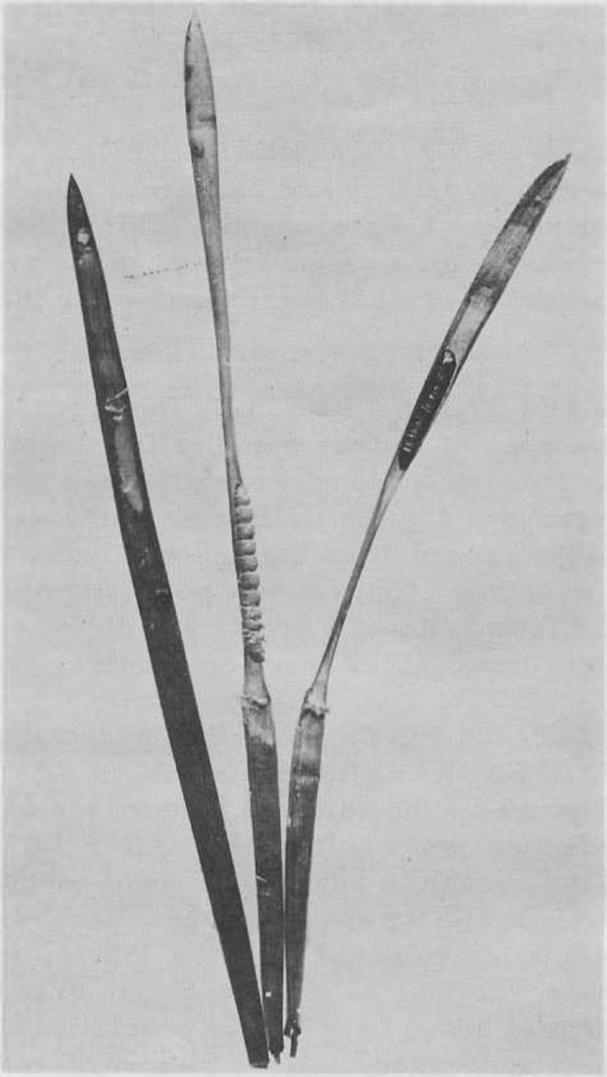

Figure 2. Lodgepole pine needles mined by the lodgepole needle miner. Needle on left shows entrance hole towards tip of needle and discoloration of needle resulting from mining. Center and right needles have been split open lengthwise to show larvae and pupae of needle miner.

The defoliators, which are capable of causing serious losses, but are at present endemic, are as follows: The infestation of spruce budworm, Choristoneura fumiferana (Clem.) in the Warner Mountains of Modoc County, was at a very low level, with very little damage to its hosts, white fir and lodgepole pine. Both white and red fir were partially defoliated by sawflies, Neodiprion abietis complex, in local areas. Natural control factors have held populations below the tree-damaging level. Several areas of reproduction were sampled and found to be without any appreciable damage from insects. The control of grasshoppers in one plantation in 1954 seems to have kept damage in this plantation low in 1955. What was once thought to have been a serious outbreak of black pine leaf scale, Nuculaspis californica (Coleman), in the Arrowhead-Crestline area, was found upon closer examination to be local concentrations of scale combined with some other as yet undetermined factor which affected trees over a much wider area. Several reports were received of adult wood borers, Arhopalus productus Lec., emerging from the framing lumber of new houses and damaging roofs, floors and walls. The holes left by these emerging beetles brought some concern to home owners. Unfortunately, known control methods are only effective in lumber before it is used in construction.

THE INSECT CONTROL PROGRAM ENDORSED FOR 1956

On November 4, 1955, the California Forest Pest Control Action Council held its annual meeting to review the status of forest pests and forest pest activities within the State during the year. Forest insect control programs recommended and carried out during 1955 were discussed and proposed control projects for 1956 were acted upon. The Action Council accepted the 1956 control program as it was proposed.

Until the Douglas-fir beetle actually becomes endemic again, continued salvage logging in the infested areas is recommended. Even though this insect has shown evidence of decline in number, many Douglas-fir trees may be killed this coming season. Effort should be maintained to remove as many of the infested and abandoned trees as is feasible. Direct control of the Douglas-fir beetle is still impractical due to difficulties in recognizing all infested trees, the widespread nature of the infestation, the rugged terrain, and the size of the trees.

The mountain pine beetle infestation, developing in association with the lodgepole needle miner infestation in Yosemite National Park, is continuing in its aggressiveness. In the two drainages of heavy infestation, Conness and Alkali Creeks, which are within about six miles of the high use Tuolumne Meadows recreational area, control is not practical. The mountain pine beetle has not yet become aggressive within the immediate vicinity of Tuolumne Meadows. The present plan is to attempt to restrict the infestation to its present southeastern limits and thus protect this recreational area. Control by use of penetrating oil spray is contemplated for about 500 acres in Dingley Creek, adjacent to Tuolumne Meadows, during the spring of 1956.

Closely allied with the mountain pine beetle problem in Yosemite is the defoliation of lodgepole pine by the lodgepole needle miner. Elimination of the bark beetle threat cannot be accomplished so long as the trees continue to be predisposed to attacks by needle miner defoliation. Research findings during the past two years show that the needle miner can be killed in its larval stage while inside the needle by the application of certain insecticides. With this information available, the next step is to conduct field tests to determine methods of application and dosages required to obtain mortality. These tests will be conducted as early in 1956 as is practicable. If satisfactory results are obtained from these preliminary tests, full-scale control efforts may be initiated.

Regeneration of Douglas-fir from natural seed source is often unsatisfactory following logging or burns. A great deal of work has been and is being done on the protection of the seed and seedlings on the ground, while little or nothing has as yet been done to protect the seed before it reaches the ground. A plan has been proposed by the U. S. Forest Service to spray the borders of several cutting areas from the air to determine if this type of treatment will offer a practical means of control for Douglas-fir cone and seed insects.

In the spring of 1954, severe defoliation of seedlings occurred on plantations in northern California from the feeding of grasshoppers. An aerial application of dieldrin was applied to the plantation area which gave almost 100 percent control. No reinfestation occurred in 1954, and even during 1955 the grasshopper population was so low that no damage to tree seedlings was found. If defoliation is threatened again this year by a large grasshopper population, a similar application of insecticide will be applied.

For several years, substantial losses have occurred in the pine stands of southern California as a result of attacks by the California flatheaded borer. In an attempt to reduce these losses, maintenance control has been carried on in several areas to remove infested pine trees in the hope that some benefits might be gained. After about three years of control effort, the losses in the areas where maintenance control was in effect have not been as great as in those areas where no control was attempted. In an effort to improve control methods, research studies show that this beetle can be killed by a deposit of DDT on the needles of the host, since the adult beetles are obliged to feed on green pine needles before they can become sexually mature. A field test of this method of control was endorsed for the Laguna area during the coming year. Forest insect conditions in high value recreational areas have shown steady improvement as the result of direct and indirect control measures. Where practical, an area which has shown heavy insect losses is first covered by sanitation-salvage logging wherein all recently killed trees are salvaged and trees which appear susceptible to bark-beetle attack, i.e., high risk trees, are removed. Following this treatment, the area is kept under surveillance and a maintenance control program instituted in which trees that are subsequently attacked are cut down and the beetle broods destroyed. Maintenance control has been recommended on five areas as a supplement to sanitation-salvage logging. In 14 other areas where logging is either impractical or against the management policy, maintenance control is recommended without the use of preliminary logging. The total acreage involved, in both the direct and indirect control programs on recreational areas, is some 113,000 acres.

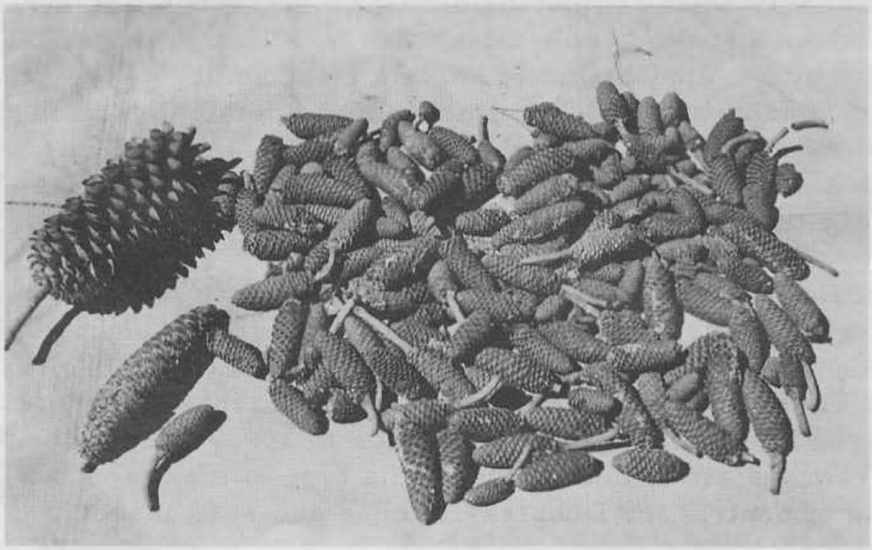

Figure 3. Sugar pine cones, pile of small cones on right are cones aborted at the end of the first year, to be compared with mature two-year old cones on left.

ACCOMPLISHMENTS OF RECENT CONTROL ACTION

The following tables summarize the forest insect control and salvage activites of the major private, State and federal forestry agencies in California for 1955.

TABLE 1.--VOLUME OF INSECT KILLED OR SUSCEPTIBLE TREES REMOVED BY PRIVATE LOGGING COMPANIES DURING 1955

Company	Volume (M.B.M.)	Tree species	Control method
Borry Bros.	7,251	PP, SP, DF, WF	Salvage, sanitation salvage
Big Bear Timber Company	16,327	JP, SP, WF	Sanitation salvage, salvage
California Foresteering	650	PP	Salvage
Crane Mills	3,750	SP, PP	Sanitation salvage, salvage
Hazel Valley	500	SP, PP	Sanitation salvage
Long Bell	250	PP	Salvage, sanitation salvage
Michigan-California	300	SP, PP, JP, WF	Salvage
McCloud	1,376	SP, PP	Sanitation salvage
Placerville	3,200	SP, PP	Sanitation salvage
Sacramento Box	1,800	SP, PP	Salvage, sanitation salvage
Setzer Forest Products	2,722	PP	Sanitation salvage
Stockton Box	65	SP, PP	Sanitation salvage
Winton Lumber	2,250	SP, PP	Sanitation salvage, salvage
	40,441* (5,200 M.B.M. is estimated to be infested)		

*This is not intended to represent the total volume of timber cut in sanitation salvage, but includes only those companies reporting their annual cut of insect susceptible and infested trees.

TABLE 2.--INSECT CONTROL PROJECTS ACCOMPLISHED ON STATE AND PRIVATE LAND IN 1955 UNDER THE STATE FOREST INSECT CONTROL LAW IN COOPERATION WITH TIMBERLAND OWNERS

Location	No. Acres	No. Trees	Insect	Host	Cost	Control Method
*Arrowhead-Crestline, San Bernardino Co.	15,849	164	Ips, Mc, Db, Dm, Dj	PP, JP, SP, CP	$5,677	Peel-burn, toxic spray
*San Jacinto, Riverside Co.	9,187	199	Mc, Db, Dm	JP, PP, SP, CP	3,414	Peel-burn, toxic spray
	25,036	363				

*Work contracted to the U. S. Forest Service.

TABLE 3.--INSECT CONTROL PERFORMED BY FEDERAL AGENCIES DURING 1955

Location	No. Acres	No. Trees	Insects	Hosts	Control method	Cost
			NATIONAL PARKS			
Lassen-Volcanic	4,000	129	Dj	JP	Fell-burn, toxic spray	$ 2,240
Sequoia-Kings Canyon	31,920	121	Db, Dm, Dj	PP, JP, SP	Fell-burn	3,574
Yosemite	58,000	333	Db, Dm, Dj, Sv	PP, JP, SP, WF	Fell-burn	13,163
	93,920	583				$18,977
			NATIONAL FORESTS			
Angeles	4,100	190	Db, Mc, Ips	PP, JP, CP	Toxic spray	$ 1,472
Cleveland	1,040	193	Mc, Ips, Db	CP, JP	Toxic spray	2,504
Los Padres	500	54	Db	CP, PP	Toxic spray	831
Inyo	700	16	Dm	LP	Toxic spray	500
San Bernardino	19,608	779	Ips, Mc,Dm,Dj	PP, JP, CP, SP	Peel-burn, toxic spray	10,831
Shasta-Trinity	70	Plantation	Grasshoppers	JP, PP	Dieldrin, aerial spray	321
Sierra	600	339	Db	PP	Peel-burn, toxic spray	277
	26,618	1,571				$16,736
			OTHER			
Institute of Forest Genetics	8,000	80	Db	PP	Fell-burn, toxic spray	$ 800

Key to Abbreviations Used:

Insects

Db - Western pine beetle
Dm - Mountain pine beetle
Dj - Jeffrey pine beetle
Ips - Pine engravers
Mc - California flatheaded borer

Host Trees

PP - Ponderosa pine
SP - Sugar pine
LP - Lodgepole pine
JP - Jeffrey pine
CP - Coulter pine
WF - White fir
DF - Douglas-fir
IC - Incense-cedar

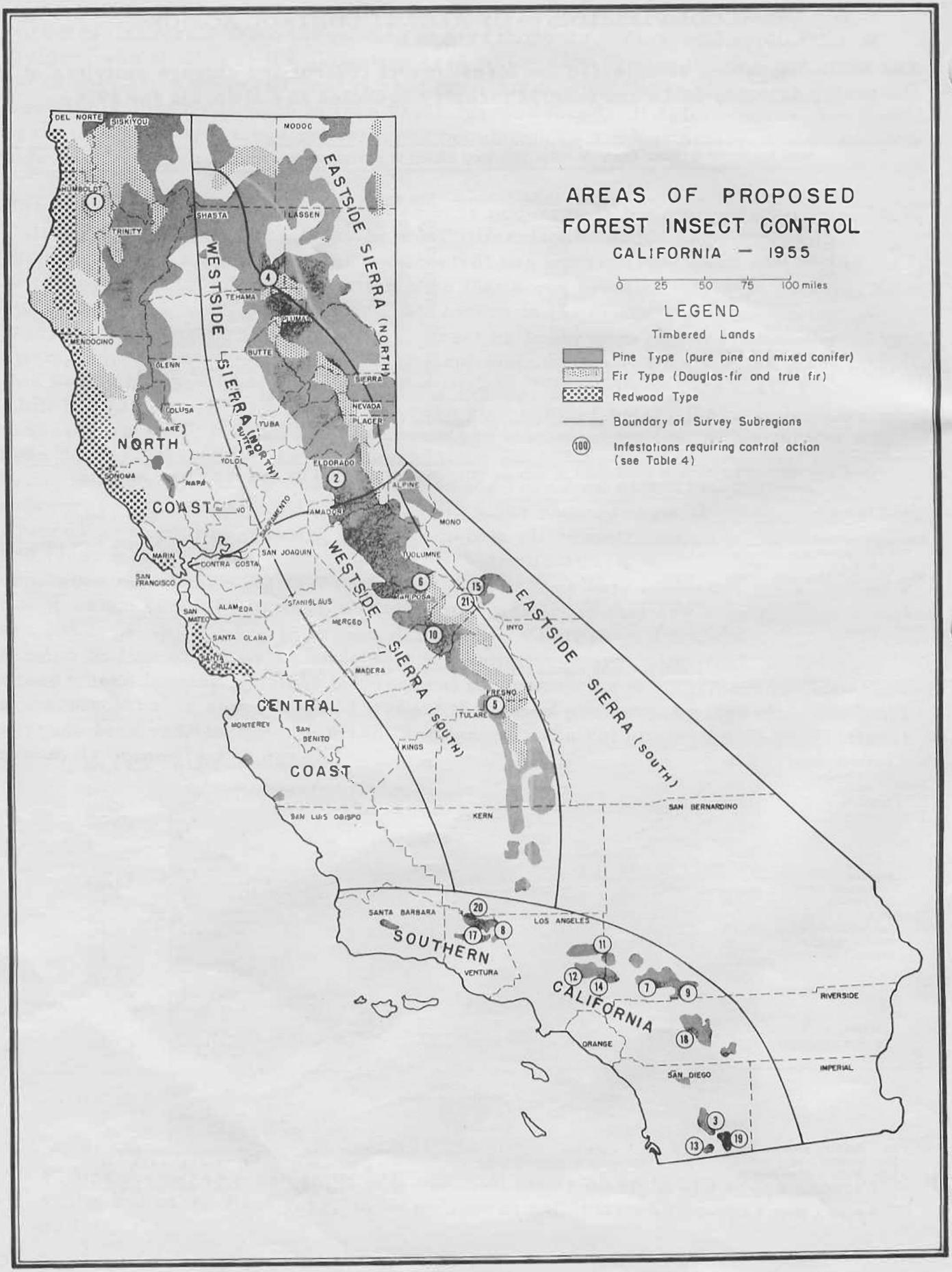
AREAS OF PROPOSED
FOREST INSECT CONTROL
CALIFORNIA — 1955
0 25 50 75 100 miles
LEGEND
Timbered Lands
Pine Type (pure pine and mixed conifer)
Fir Type (Douglas-fir and true fir)
Redwood Type
Boundary of Survey Subregions
(100) Infestations requiring control action (see Table 4)
NORTH COAST
CENTRAL COAST
SOUTHERN CALIFORNIA
WESTSIDE SIERRA (NORTH)
EASTSIDE SIERRA (NORTH)
WESTSIDE SIERRA (SOUTH)
EASTSIDE SIERRA (SOUTH)
DEL NORTE
SISKIYOU
MODOC
HUMBOLDT
TRINITY
SHASTA
LASSEN
TEHAMA
PLUMAS
MENDOCINO
BUTTE
GLENN
SIERRA
COLUSA
NEVADA
LAKE
PLACER
YUBA
YOLO
SUTTER
EL DORADO
SONOMA
NAPA
ALPINE
AMADOR
SACRAMENTO
MONO
MARIN
SAN JOAQUIN
CONTRA COSTA
TUOLUMNE
SAN FRANCISCO
MARIPOSA
ALAMEDA
STANISLAUS
SAN MATEO
MERCED
INYO
SANTA CLARA
SANTA CRUZ
MADERA
FRESNO
MONTEREY
TULARE
SAN BENITO
KINGS
SAN LUIS OBISPO
KERN
SAN BERNARDINO
SANTA BARBARA
LOS ANGELES
VENTURA
RIVERSIDE
ORANGE
SAN DIEGO
IMPERIAL

TABLE 4.--CURRENT FOREST INSECT INFESTATION AREAS REQUIRING ACTION

	PROJECT AREA	LOCATION	INFESTED ACREAGE	INSECT SPECIES CAUSING LOSS	HOST TREES KILLED	RECOMMENDED ACTION
				COMMERCIAL TIMBERLANDS		
(1)	Klamath River and Trinity River Drainages	Del Norte, Humboldt, Siskiyou and Trinity Cos.	200,000	Douglas-fir beetle	Douglas-fir	Salvage merchantable infested trees where feasible.
				Cone moth-seed chalcid	Douglas-fir	Exper. field tests
				EXPERIMENTAL AREAS		
(2)	Institute of Forest Genetics	Eldorado Co.	500	Western pine beetle Pine engravers	Ponderosa pine	Maintenance control, fell-peel-burn, or spray with toxic oil
				STATE AND NATIONAL PARKS		
(3)	Cuyamaca Rancho State Park	San Diego Co.	8,000	California flatheaded borer	Jeffrey pine	Maintenance control, spray with toxic oil
(4)	Lassen Volcanic National Park	Shasta, Lassen Cos.	8,000	Jeffrey pine beetle Western pine beetle Mountain pine beetle	Jeffrey pine Ponderosa pine	Maintenance control, spray with toxic oil
(5)	Sequoia-Kings Canyon National Parks	Fresno and Tulare Cos.	8,500	Western pine beetle Mountain pine beetle	Ponderosa pine Sugar pine	Maintenance control, fell-peel-burn, or spray with toxic oil
(6)	Yosemite National Park	Mariposa, Tuolumne Cos.	10,000	Western pine beetle Mountain pine beetle	Ponderosa pine Sugar pine	Maintenance control, spray with oil or fell-peel-burn
			500	Mountain pine beetle Lodgepole needle miner	Lodgepole pine Lodgepole	Toxic spray Experimental field tests
				FOREST RECREATION AREAS		
(7)	Arrowhead-Crestline	San Bernardino Co.	38,000	Mountain pine beetle Western pine beetle Pine engravers Jeffrey pine beetle	Ponderosa pine Coulter pine Jeffrey pine	Maintenance control, fell-peel-burn or toxic spray, salvage
(8)	Alamo Mountain	Ventura Co.	6,500	Jeffrey pine beetle California flatheaded borer Western pine beetle	Jeffrey pine Ponderosa pine	Sanitation salvage
(9)	Barton Flat	San Bernardino Co.	7,500	Western pine beetle Jeffrey pine beetle	Ponderosa pine Jeffrey pine	Maintenance control
(10)	Bass Lake	Madera Co.	600	Western pine beetle Pine engravers	Ponderosa pine	Maintenance control, fell-peel-burn or toxic spray
(11)	Big Pines	Los Angeles Co.	2,500	California flatheaded borer	Jeffrey pine	Continued sanitation salvage - maintenance control
(12)	Charlton Flats	Los Angeles Co.	3,000	Western pine beetle Pine engravers Calif. flatheaded borer	Ponderosa pine Coulter pine Jeffrey pine	Maintenance control, fell-peel-burn or toxic spray, salvage
(13)	Corte Madera	San Diego Co.	1,600	Western pine beetle Pine engravers Calif. flathead borer	Coulter pine Jeffrey pine Ponderosa pine	Maintenance control, fell-peel-burn or toxic spray
(14)	Crystal Lake	Los Angeles Co.	1,100	Western pine beetle Mountain pine beetle Jeffrey pine beetle	Ponderosa pine Sugar pine Jeffrey pine	Maintenance control, fell-peel-burn or toxic spray
(15)	Deadman Summit	Inyo N. F.	10,000	Jeffrey pine beetle Calif. flathead borer	Jeffrey pine	Continued sanitation salvage - maintenance control
(16)	Figueroa Mountain	Santa Barbara Co.	1,500	Western pine beetle	Ponderosa pine Coulter pine	Maintenance control, fell-peel-burn or toxic spray
(17)	Grade Valley	Ventura Co.	5,000	Calif. flathead borer	Jeffrey pine	Continued sanitation-salvage - maintenance control
(18)	Idyllwild-San Jacinto	Riverside Co.	14,500	Calif. flathead borer Western pine beetle Pine engravers Mountain pine beetle	Sugar pine Ponderosa pine Coulter pine Jeffrey pine	Maintenance control, fell-peel-burn or toxic spray, salvage
(19)	Laguna Mountain	San Diego Co.	1,500	Western pine beetle Calif. flathead borer	Coulter pine Jeffrey pine	Maintenance control, fell-peel-burn or toxic spray, salvage; experimental field tests
(20)	Mount Pinos	Ventura Co.	2,500	Calif. flathead borer	Jeffrey pine	Continued sanitation salvage - maintenance control
(21)	Reds Meadow	Inyo N. F.	700	Mountain pine beetle	Lodgepole pine	Maintenance control, spray with toxic oil

FOREST DISEASES

For the first time a small amount of Pest Control Act funds was made available July 1, 1955 to initiate a forest disease survey in California. The late season start and the inadequacy of funds prevented a thorough coverage of disease conditions throughout the State this first year. The summary presented here was prepared primarily from detection reports sent in by various cooperators, and from observations made by Forest Service pathologists. Comparisons of 1955 damage with that in former years cannot be made for most of the diseases, as no detailed inventory of disease conditions in the State has been previously made.

DWARFMISTLETOE, Arceuthobium campylopodum Engelm. f. abietinum

Severe damage occurs in red fir stands throughout the State. Damage conditions are given for three general areas of red fir. In the southern Sierras heaviest losses of mature trees are in the Cargyle Creek drainage, and more scattered killing occurs at Chilkoot Lake, North Fork of Kings River, Crown Valley, and Wet Meadows on the Sierra and Reds Meadow on the Inyo National Forests. Salvage is planned where possible, with cutting to remove all infected trees in the overstory, at least in small areas. In the northern Sierras the greatest damage is in Lassen Park, and on the eastside in Plumas and Lassen Counties. Dead trees should be removed in heavily used parts of the park and salvage by priority cutting in other areas of heavy mortality. In the north end of the State heavy infections have been reported at numerous locations on the Lassen, Shasta-Trinity, and Klamath National Forests. No action has been taken.

Figure 4. Heavy damage from dwarfmistletoe with stand breakup of cankered or killed trees, in an old-growth red fir stand in Cargyle Creek drainage, Minarets District of Sierra National Forest.

DWARFMISTLETOE, A. campylopodum forma typicum

Extensive damage to large trees and considerable mortality of reproduction was found in ponderosa and Jeffrey pine stands in east Plumas and southern Lassen Counties, and experimental control is now in progress in the Last Chance Creek drainage. Heavy infection in mature ponderosa stands on the Sequoia National Forest was reported, and experimental control was recommended on the Peppermint Unit there. Dwarfmistletoe is common in other conifers in the State, causing severe damage in localized areas. Heavily infected sugar pines in the overstory should be marked for cutting.

ELYTRODERMA NEEDLE DISEASE, Elytroderma deformans (Weir) Darker

Ponderosa and Jeffrey pine stands throughout much of the State contain heavy infections, and severe damage with some mortality was reported at three locations. In Lassen National Park dead trees were removed in the immediate vicinity of Manzanita Lake Recreation Area. In the Tahoe Lake Recreation Area heavy damage continues, and mortality is increasing. The heaviest losses have been from Bliss State Park south to Tahoe Valley. No control has been recommended pending results of further research. In the Evans Flat area, on the Sequoia National Forest, tree mortality and decline were especially heavy this year. Salvage of dead trees and cutting heavily infected and declining trees was recommended.

WHITE PINE BLISTER RUST, Cronartium ribicola Fischer

This rust is epidemic in many of the young sugar pine stands in Siskiyou and Shasta Counties where many of these pines have been killed, and severe losses of seedlings and saplings continue throughout the sugar pine type. Over extensive areas 25 percent of all sugar pines 8 inches in diameter and under are presently infected. Western white and white bark pines are infected in much of the high elevation white pine type, and severe damage and losses are occurring in trees of all sizes throughout the Marble Mountains. On some extensive areas over 50 percent of the white pines are infected. No action was recommended in the high elevation pines. In sugar pine the rust is being controlled through ribes eradication on approved areas totaling 29,000 acres. Salvage pruning of infected crop trees is being done on a pilot study basis.

The rust is present on sugar pines in many localities throughout the sugar pine type of Tehama, Butte, Yuba, and Plumas Counties. In one area of 108 acres in Wildcat Creek drainage, southwest of Bucks Lake, 45 percent of the sugar pine crop trees are infected. Control through ribes eradication and canker removal is being done on 201,000 acres selected for sugar pine management.

Infection on sugar pine in Sierra, Nevada, and Placer Counties occurs at a number of locations in the North Fork of the Yuba drainage. On 183 acres along Empire Creek 2,400 trees, or about 25 percent of the sugar pine stand, are infected. Other major infection areas in these counties are at Fiddle Creek, Pipe Creek, Canyon Creek, French Meadows, and Greek Store. Lighter pine infections are scattered in other localities. Ribes eradication and canker removal is being done on 29,000 acres approved for sugar pine management.

In Eldorado, Amador, Calaveras, and Tuolumne Counties infected sugar pines have been found at 31 localities. The infection varies from a single tree in a few places to over 100 in other areas. The southernmost known infection is on Dodge Ridge in Tuolumne County. Blister rust is being controlled through ribes eradication and canker removal on 192,000 acres selected for sugar pine management.

In Trinity County and the Coast Range rust infection is general on sugar pine and other white pines in Trinity County as far south as the Yolla Bolla Mountains. None is known in the Coast Range south of here. Ribes eradication is scheduled for sugar pine stands totaling 4,800 acres.

COMANDRA BLISTER RUST, Cronartium comandrae Peck.
In the Goosenest and Ball Mountain area on the Klamath National Forest, ponderosa pine mortality has been heavy in past years. An unusually large number of pole-size trees were killed in 1955. Many of these trees have broken off at severe bole cankers. Plans to establish a study plot to determine annual loss in this area have been made.

LIMB BLISTER RUST, Cronartium stalactiforme A. & K.
This disease has been causing mortality in ponderosa and Jeffrey pines at Big Bear, Cajon and San Gorgonio on the San Bernardino National Forest. Damage has been reported to have increased in 1955. At Mammoth Lake on the Inyo and at Silver City on the Toiyabe National Forests this rust continues to cause damage to both immature and mature trees. The only action that can now be recommended is cutting of dead and badly damaged trees pending further study of the complex rust forms.

BOLE CANKER RUST, Cronartium stalactiforme A. & K.
This form of the rust on lodgepole pine causes extensive damage through deforming, stagnating, and killing mature trees throughout both east and west side Sierras. No control is recommended.

WESTERN GALL RUST, Cronartium harknessii (Moore) Meinecke
This widespread rust on various hard pines was reported to be causing some damage on lodgepole pine in Del Norte County in 1955. No control was recommended.

NEEDLECAST, Hypoderma robustum Tub.
Damage from this fungus was heavy in white fir in 1955 at several locations in Lassen, Shasta, and Plumas Counties. No control is recommended.

NEEDLECAST, Hypodermella medusa Dearn.
Fall drought conditions were exceptionally favorable in 1954 for the development of this fungus on ponderosa and Jeffrey pines in Lassen County, resulting in heavy needle loss in the spring of 1955. No recommendations were made.

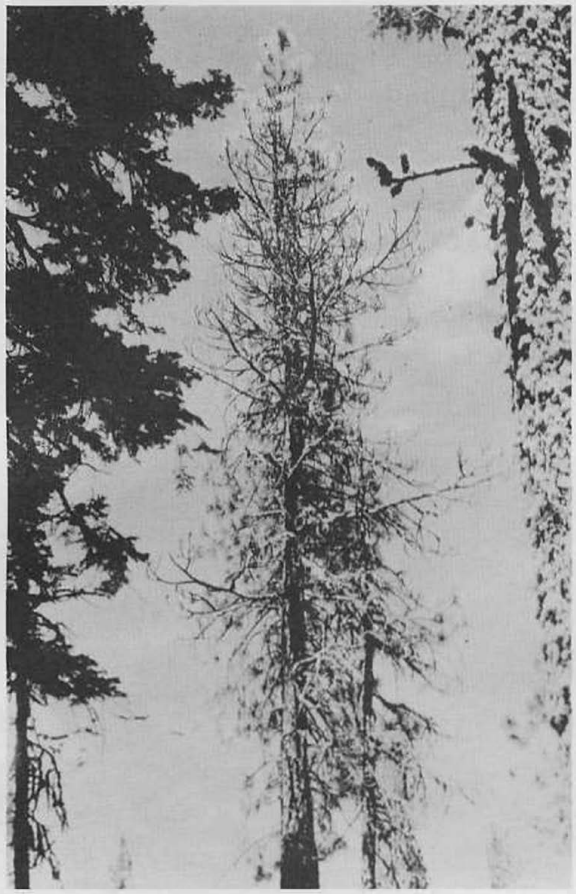

Figure 5. Ponderosa pines killed by Elytroderma needle disease, Lassen National Park.

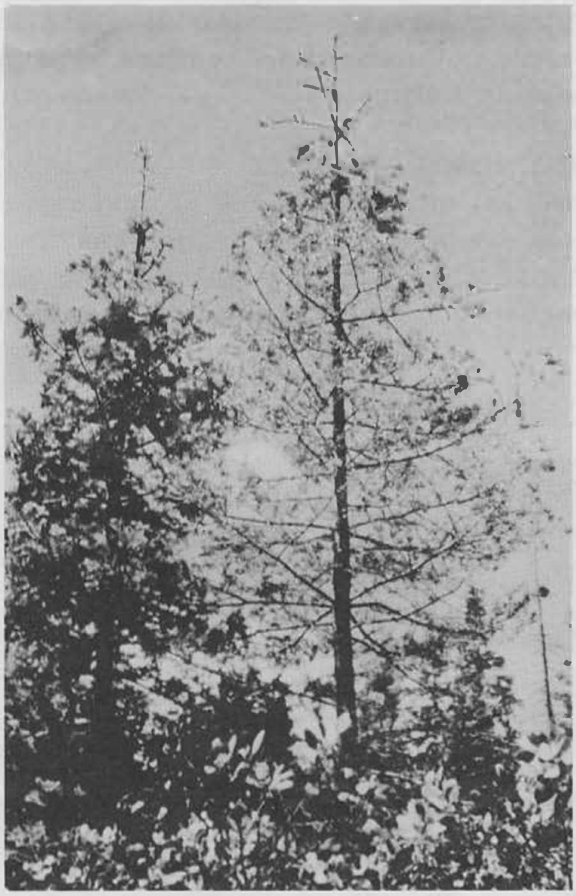

Figure 6. Young white fir partially defoliated by the needle-cast fungus, Hypoderma robustum, in Shasta County.

LEPTOGRAPHIUM ROOT DISEASE, Leptographium sp.

Recent mortality in both young and old-growth ponderosa and Jeffrey pines was noted on the Blacks Mountain Experimental Forest in the spring of 1955. These are the first noted for several years in this area. This disease may be on the increase here. Continued surveillance is planned.

OTHER ROOT DISEASES, Fomes annosus (Fr.) Cke. and Armillarea mellea (Vahl.) Quel.

Mortality from the important root diseases, Fomes root disease and the shoestring fungus, are now at a fairly low ebb throughout the State. The most killing observed in 1955 was in the Blacks Mountain area. No action has been taken.

WINTER INJURY AND OTHER NONINFECTIOUS DISEASES

Some winter injury was evident over much of the eastside Sierras in the spring. Notable was top killing of incense-cedar reproduction on marginal cedar sites; manzanita killing over the entire eastside; and red belt on various species in the Mammoth Lake area. A number of other reports of physiological damage and mortality were received. Of special interest were: Decline and

dying of Douglas-fir near Pondosa in Shasta County; decline of ponderosa and Jeffrey pines in the Crestline area of San Bernardino County; and redwood die-back in Humboldt County. Research on control methods is needed.

UNKNOWN DISEASES

Several minor diseases of unknown cause have been reported. One of special concern was causing branch and tree killing of black oak in the vicinity of Dunsmuir. Further surveillance and research on the causal organism are needed before control recommendations can be made.

Figure 7. Dwarfmistletoe control area in ponderosa and Jeffrey pine, showing stand remaining after the infected trees have been removed. Last Chance Creek drainage, Plumas National Forest.

Table 5. --SUMMARY OF FOREST DISEASE CONTROL OR RECOMMENDED ACTION

Location	Disease	Host Trees	Control or Recommendation
Southern Sierra Northern Sierra	Dwarfmistletoe	Red fir	Sanitation salvage recommended
East Plumas and Southern Lassen Counties	Dwarfmistletoe	Ponderosa pine Jeffrey pine	Experimental control conducted
Sequoia National Forest	Dwarfmistletoe	Ponderosa pine Jeffrey pine	Experimental control recommended
Lassen National Park	Elytroderma needle disease	Ponderosa pine Jeffrey pine	Dead trees removed near Manzanita Lake
Sequoia National Forest	Elytroderma needle disease	Ponderosa pine Jeffrey pine	Sanitation salvage recommended
Siskiyou and Shasta Counties	White pine blister rust	Sugar pine	Control by ribes removal on 29,000 acres
Tehama, Butte, Yuba and Plumas Counties	White pine blister rust	Sugar pine	Control by ribes and canker removal on 201,000 acres
Sierra, Nevada and Placer Counties	White pine blister rust	Sugar pine	Control by ribes and canker removal on 29,000 acres
Eldorado, Amador, Calaveras and Tuolumne Counties	White pine blister rust	Sugar pine	Control by ribes and canker removal on 192,000 acres
Trinity County and Coast Range Mountains	White pine blister rust	Sugar pine	Ribes removal scheduled on 4,800 acres
Klamath National Forest	Comandra blister rust	Ponderosa pine	Establishment of study plot for surveillance scheduled
San Bernardino, Inyo and Toiyabe National Forests	Limb blister rust	Ponderosa pine Jeffrey pine	Sanitation salvage recommended
Lassen National Forest	Leptographium root disease	Ponderosa pine Jeffrey pine	Continued surveillance planned
Shasta County	Noninfectious disease	Douglas-fir	Establishment of study plot scheduled
San Bernardino National Forest	Noninfectious disease	Ponderosa pine Jeffrey pine	Research recommended

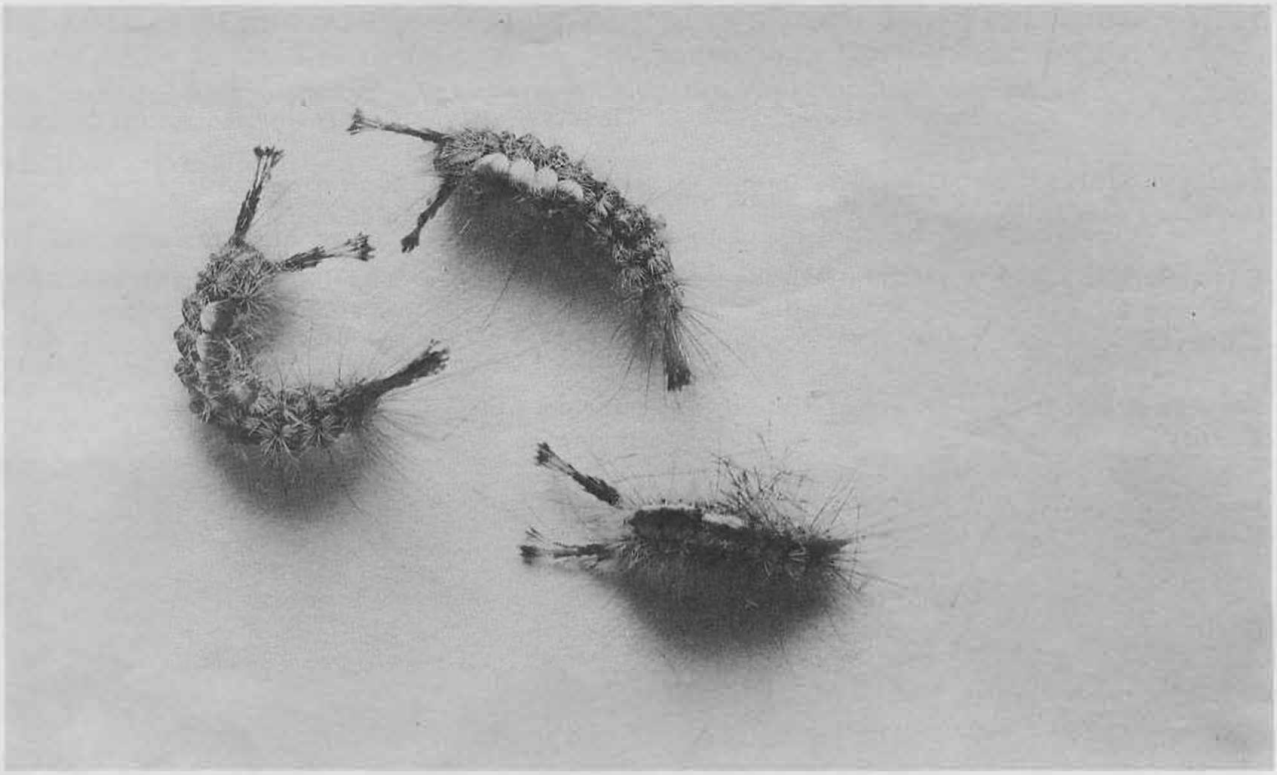

Figure 8. Caterpillars of Douglas-fir tussock moth which reached destructive numbers on the Stanislaus National Forest during 1955.

Figure 9. General view of white fir defoliated by the Douglas-fir tussock moth.

Additional information concerning forest pests may be obtained by request to:

California Division of Forestry
301 State Office Building No. 1
Sacramento, California

or

California Forest and Range Experiment Station
Division of Forest Insect Research
Box 245
Berkeley 1, California

33279 2-56 3M